CLAIMS

What is claimed is:

1. A laser system, comprising:
a laser element having a laser signal output, the wavelength profile of which changes with a change in operating conditions; and
a wavelength-selective stabilizing reflective filter in line with the laser for receiving the laser signal, said reflective filter having a reflectivity profile having reflectivity peaks at two predetermined spaced wavelengths within the operating wavelength of the laser in the absence of said filter, the reflective filter being partially reflective at said different predetermined reflective spaced wavelengths and substantially less reflective in a wavelength band there between, and providing optical feedback of a portion of the laser signal to the laser element that wavelength-stabilizes its output, a degree of reflectivity at said predetermined wavelengths and a relative wavelength separation between the predetermined spaced wavelengths being such that throughout the change in operating conditions, output power of the laser element is concentrated at one or more of the reflector center wavelengths, with regions of negligible output power at wavelength sections between the reflector center wavelengths.

2. A laser system as defined in claim 1 wherein the reflective filter comprises two filters having different reflectivity responses, one of the filters having a reflectivity peak at one of the two predetermined spaced wavelengths and the other of the filters having a reflectivity peak at the other of the two predetermined spaced wavelength.

3. A laser system as defined in claim 2 wherein the two filters are arranged serially so that in operation the laser signal is incident upon the two filters.

4. A laser system as recited in claim 1, wherein the laser system is without active cooling.

5. A laser system as recited in claim 1, further comprising an optical fiber coupled to receive light transmitted from the output of the laser system.

6. A laser system as recited in claim 5, wherein the wavelength selective reflective filter includes wavelength selective reflectors in the form of fiber Bragg gratings.

7. A laser system as recited in claim 1, wherein the wavelength selective reflective filter includes wavelength selective dielectric coatings.

8. A laser system as recited in claim 1, wherein the system comprises two of said predetermined wavelengths that are located in wavelength to either side of a wavelength peak in an absorption spectrum of a gain medium to be pumped by the system.

9. A laser system as recited in claim 8, wherein the predetermined wavelengths are substantially equidistant in wavelength from the absorption peak.

10. A laser system as recited in claim 2, wherein the degree of reflectivity of each of the reflective filters is approximately equal.

11. A laser system as recited in claim 1, further comprising a passive heat sink in thermal contact with the laser system.

12. A laser system as recited in claim 1 wherein the wavelength selective reflective filter includes two reflectors providing feedback to the laser element and wherein the laser is stabilized solely by the optical feedback provided by the wavelength-selective stabilizing reflectors in series.

13. A laser system as recited in claim 1 wherein said change in operating conditions comprises a change in an operating temperature of the laser element.

14. A laser system as recited in claim 1 wherein the laser element comprises a semiconductor laser.

15. A laser system as recited in claim 1 wherein the wavelength selective filter is a holographic volume Bragg grating.

16. A laser system as recited in claim 1 wherein the wavelength selective filter is a Bragg grating written in a free space optical element.

17. A laser system as recited in claim 3 wherein said change in operating conditions comprises a change in an operating temperature of the laser element.

18. A laser system as recited in claim 3 wherein the laser element comprises a semiconductor laser.

19. A laser system as recited in claim 1 wherein the wavelength selective filter is a complex Bragg grating having two distinct reflectivity peaks at the predetermined wavelength.

20. A laser system as defined in claim 1, further comprising a gain medium optically coupled with the laser element for receiving pump energy therefrom.

21. A laser system as defined in claim 20, wherein the optical gain medium comprises a rare earth-doped fiber amplifier.

22. A laser system as defined in claim 20, further comprising an optical isolator in an optical path with the gain medium.

23. A laser system as defined in claim 20, further comprising an output signal monitor that detects light output by the gain medium and generates a monitor signal indicative thereof.

24. A laser system as defined in claim 23 further comprising a controller that receives the monitor signal and generates an output signal that is used to adjust the operation of the laser in response to the monitor signal.

25. A laser system as defined in claim 24 further comprising an input signal monitor that detects light input to the gain medium and generates a monitor signal indicative thereof and directs it to the controller.

26. A laser system as defined in claim 20 wherein the system comprises two of said predetermined wavelengths that are located in wavelength to either side of a wavelength peak in an absorption spectrum of a gain medium to be pumped by the system.

27. A laser system as recited in claim 26, wherein the predetermined wavelengths are substantially equidistant in wavelength from the absorption peak.